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## **KNOWLEDGE MANAGEMENT FOR SMEs IN THE KNOWLEDGE-BASED ECONOMY**

*In the knowledge-based economy firms are faced with much more capricious and diverse consumer preferences than ever. These consumers are increasingly interested in status, reputation, brand names, design, satisfaction, and post-sales service. Also, life span of products and services is shortened. In general, the advance of information technology and the advent of knowledge-based economy as the result of IT make the business environment for the average entrepreneur more complex. Knowledge can be used to reduce these complexities. The aim of this paper is to point out that knowledge is the factor that allows entrepreneurs to distinguish themselves from their competitors. Knowledge is the means for SMEs to overcome poor business environment and change the complex business environment to be manageable. The main research goal of this paper is to form and present a model for knowledge management which would help SMEs to be able to interpret the environment complexity and extract implications from that. The last is actually the expected result: the application of the model should stimulate building competitive advantage and support the firm's competitive position.*

**Key words:** knowledge management, SMEs, model, competitive advantage

Labor, land and capital had been the most important factors of production in the economy system for the last two centuries. Knowledge, education and intellectual capital were treated as exogenous variables that existed outside the system itself. Several economists (among who Romer(1986), Lucas (1988) Barro and Sala-i-Martin (1995)) have proposed a new model that included knowledge (or technology) as an intrinsic part of the economy system to explain the cause of long-term growth with which traditional economic models had difficulty. They suggested that knowledge became the fourth factor of production in leading economies.

The features of this endogenous growth theory are presented as follows. First, knowledge is the basic form of capital. Economic growth is driven by the accumulation of knowledge. Secondly, new technological developments can create technical platforms for further innovations, and this technical platform plays a key role of driving economic growth. Thirdly, technology can improve the return on investment to the extent that could not be attained only with labor and material resources, which leads to increasing marginal rate of returns on technological investment. Lastly, contrary to traditional economy, investment and technology make each other more valuable, which leads to increasing a country's growth rate permanently. An investment on R&D for technological innovation provides an opportunity that can enjoy the returns from monopoly.

A knowledge-based economy is one in which the above-mentioned features are revealed distinctly. The term "knowledge-based economy" results from the full recognition of the role of knowledge in economic growth. In a knowledge-based economy, the generation and exploitation of knowledge play the predominant role in the creation of wealth. Many advanced nations such as the US and OECD countries are more strongly dependent on the use of knowledge than ever before. Output and employment are expanding the most rapidly in high-technology industries like computers, electronics and information technology. Knowledge-intensive service industries such as education, communications and financial services are growing even faster as well. Those countries have experienced that the share of high-technology sector in GDP has been more than doubled over the past decade. The employment is growing in high-technology sector as well as knowledge-intensive service sector. Indeed, nonproduction or knowledge workers are in most demand in a wide range of activities from computer technician, architect to financial specialist. In advanced economies such as the US, more than 60 percent of workers are knowledge workers.

With the advent of information and communication technologies like the Internet, manufacturers and consumers can now move around any market in the world. Consumers can inspect the prices offered by all vendors over the world for any product while manufacturers can sell their products at the world market with unlimited size. This is the phenomenon called "globalization". Globalization is facilitated by the knowledge and technology while globalization works as the main driver of the emerging knowledge-based economy. Competition is fostered by the increasing size of the market opened up by globalization.

Products with a high knowledge component generate higher returns and a greater growth potential in the global market. Knowledge and technology spreads more quickly, but products and processes can be swiftly imitated and competitive advantage can be swiftly eroded as well. A firm (or country) that wants to maintain its competitive position must be able to innovate even more quickly than its competitors.

## 1. Knowledge variants

Knowledge can certainly not be assumed to be equal to data. Above all, knowledge cannot be considered equal to information. Knowledge can primarily be described as something that makes both data and information manageable and meaningful. Knowledge can be classified into different types which are necessary to understand the principles of the knowledge-based economy. The knowledge variants are: know-what, know-why, know-how and know-who.

Knowledge is a much broader concept than information which is generally related to the “know-what” and “know-why” components of knowledge. These are the *explicit knowledge* that can be expressed through language. Thus, the explicit knowledge is relatively easy to codify and transfer to others. Other types of knowledge – particularly know-how and know-who – are *tacit knowledge* that is acquired mainly by experience and are more difficult to codify, measure and transmit.

1) **Know-what** refers to knowledge about “facts”. Answers to such questions as “Which is the revenue of 2001?”, “How many employees does your company employ?” are examples of this kind of knowledge. Here, knowledge is close to what is normally called information. In dealing with some complicated matters, experts like lawyers and analysts must have a lot of know-what (information) to perform a specific job.

2) **Know-why** refers to scientific knowledge of the principles and laws of nature. This kind of knowledge underlies development of technology, products or processes in industrial area. The acquisition of know-why is accomplished in specialized organizations such as research laboratories. To get access to this kind of knowledge, firms have to interact with these organizations either through employing trained specialists or through purchasing necessary knowledge and sponsoring joint activities.

3) **Know-how** refers to skills or the capability to do something. Businessmen judging market prospects for a new product or a personnel manager selecting and training staff have to use their know-how. The same is true for the skilled worker operating complicated machines. Know-how is typically a kind of knowledge developed from experiences and kept within a specific individual or a specific firm. This kind of knowledge is hard to codify in language. A firm may establish industrial networks to share and combine elements of know-how or adopt out-sourcing to efficiently utilize others' know-how.

4) **Know-who** refers to information about who knows what and who knows how to do what. It involves the formation of special social connections, which make it possible to get access to experts and use their knowledge efficiently. Know-who is important in economies where information is widely dispersed and imbalanced because of a highly developed division of work forces and a rapid change (or an advance) of technology.

While know-what and know-why can be obtained through reading books, attending lectures and accessing databases, the other two kinds of knowledge are rooted primarily in practical experience. Know-how will typically be learned in situations where an apprentice follows a master and inherits know-how from a master. Know-who can be earned in social practice and sometimes in specialized educational environments. One reason why firms engage in basic research is to acquire access to networks of academic experts crucial for enhancing their innovative capability. Know-who is socially embedded knowledge, which cannot easily be transferred through formal channels of information.

The knowledge-based economy is characterized by the need for continuous learning of both codified information and the competencies to use this information. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial. Tacit knowledge in the form of skills needed to handle explicit knowledge is more important than ever in labor markets. Codified knowledge might be considered as the material to be transformed, and tacit knowledge, particularly know-how, as the tool for handling this material. Capabilities for selecting relevant and disregarding irrelevant information, recognizing patterns in information, interpreting and decoding information as well as learning new and discarding old skills are in increasing demand.

The accumulation of tacit knowledge needed to derive maximum benefit from explicit knowledge codified through information technologies can only be done through learning. Without investments in both explicit knowledge and tacit skill development, informational constraints may be a significant factor

degrading the allocation efficiency of market economies. Workers will require both formal education and the ability to acquire and apply new theoretical and analytical knowledge; they will increasingly be paid for their explicit and tacit knowledge skills rather than for manual work. Education will be the center of the knowledge-based economy and learning the tool of individual and organizational advancement.

This process of learning is more than just acquiring formal education. In the knowledge-based economy “learning-by-doing” is paramount. A fundamental aspect of learning is the transformation of tacit into explicit knowledge and the movement back to practice where new kinds of tacit knowledge are developed. Training and learning in non-formal settings, increasingly possible due to information technologies, are more common. Firms themselves face the need to become learning organizations, continuously adapting management, organization and skills to accommodate new technologies. They are also joined in networks, where interactive learning involving producers and users in experimentation and exchange of information is the driver of innovation.

## 2. Knowledge management for SMEs

It is necessary to interpret “knowledge” from the firm’s perspective of enhancing its competitive advantage. Firms constantly make decisions on various business activities and try to operate efficiently and effectively to make profit. In this context, knowledge is the factor that is useful for business decision making and business operation. Then, knowledge can be defined here as a collection of facts, know-how, patterns and systems that are embedded in individuals or the organization itself, which can be utilized in the process of decision making and business operation. Table 1 lists the specific knowledge that a firm possesses at both organizational and individual level.

**Table 1: Forms of knowledge within a firm**

	<b>Organizational knowledge</b>	<b>Individual knowledge</b>
<b>Facts</b>	Brand image Degree of customer satisfaction Patent Database of customers Communication infrastructure	Expert knowledge General knowledge for operation Foreign language
<b>Know-how</b>	Experience for FDI New product development skills Design skills Skills for financial management Skills for risk management Skills for cost management Skills for outsourcing	Expert knowledge General knowledge for operation Foreign language
<b>Pattern</b>	Meeting style (Speed meeting) Decision making style Operational process	
<b>Institution</b>	Evaluation system Welfare system Firm culture, vision, mission	

Source: Malhotra, Y., “Knowledge Management and New Organization Forms: A Framework for Business Model Innovation”, *Information Resources Management Journal*, 2000, 3-15p.

Facts include know-what and know-why variants of knowledge that are obtained from experience and learning. Know-how is the firm’s specific production technology or management skills. Pattern implies internal process of doing jobs while institution refers to company’s by-law, rules and organizational culture. Knowledge that is firm specific is hard to transfer, imitate and trade and its value can be vastly reduced when it is applied outside the firm.

It is important that an entrepreneur should utilize accumulated knowledge in an organization and individuals to contribute to firm’s performance. Only firms solidifying and sustaining competitive power can survive, develop and grow. Knowledge management is recognized as total means to improve firm’s performance by applying it to production, marketing, research & development, personnel, planning and innovation. Thus, the vision of knowledge management is to improve firm’s competitive position or to maintain the current. Knowledge management is the management of knowledge assets within an organization to enhance the firm’s competitive advantage by steering the product leadership, operational excellence and customer intimacy.

The resource-based theory suggests that the firm's asset can be a source of competitive advantage when it is scarce, hard to imitate and hard to substitute. The knowledge assets retained within a firm satisfy these features of a source of competitive advantage. A firm cannot have the same knowledge as the others' because different firms have different human and knowledge resources. Also, a firm cannot imitate other's knowledge because knowledge is accumulated as the result of experience and investment over the long-time period.

### 3. The elements of the knowledge management model

The presented knowledge management model consists of five elements: objective, strategy, knowledge assets, knowledge activities and knowledge infrastructure. These are the knowledge management domains in which an entrepreneur can effectively target himself.

An entrepreneur moves around these domains by performing knowledge activity management and knowledge asset management in particular.

**Table 2: Knowledge activity management and knowledge asset management**

	<b>Knowledge Activity Management</b>	<b>Knowledge Asset Management</b>
<b>Input</b>	Knowledge Infrastructure	Knowledge Assets
<b>Process</b>	Creation, Sharing, Accumulation, Learning	Product Leadership, Operational Excellence, Customer Intimacy
<b>Output</b>	Improvement of competitiveness of firm's knowledge	Improvement of firm's competitive advantage

Source: Davenport, T.H., Jarvenpaa, S.J.; and Beers, M.C. "Improving Knowledge Work Processes", *Sloan Management Review*, 1996, 53-65.

The knowledge activity management is to improve competitiveness of knowledge assets by efficiently managing activities such as knowledge creation, knowledge sharing, knowledge transfer and knowledge learning through knowledge infrastructure which is formed by organization, human capital and information technology. Knowledge asset management improves firm's competitive advantage by utilizing knowledge assets to achieve product leadership, operational excellence and customer intimacy. The success of knowledge management depends upon how well these two processes, knowledge activity management and knowledge asset management, are harmoniously performed.

#### 3.1 Objective

The objective of knowledge management is not to seek or create knowledge itself, but to improve firm's overall competitive advantage by utilizing firm's knowledge. In this sense, the requisites for competitive advantage are sustainable competence, visible competence and win-win competence. These three requisites imply that the competitive advantage is not temporary or impulse but continuous and can be assessed by visible criteria like increased sales or improvement in the firm's image.

#### 3.2 Strategy

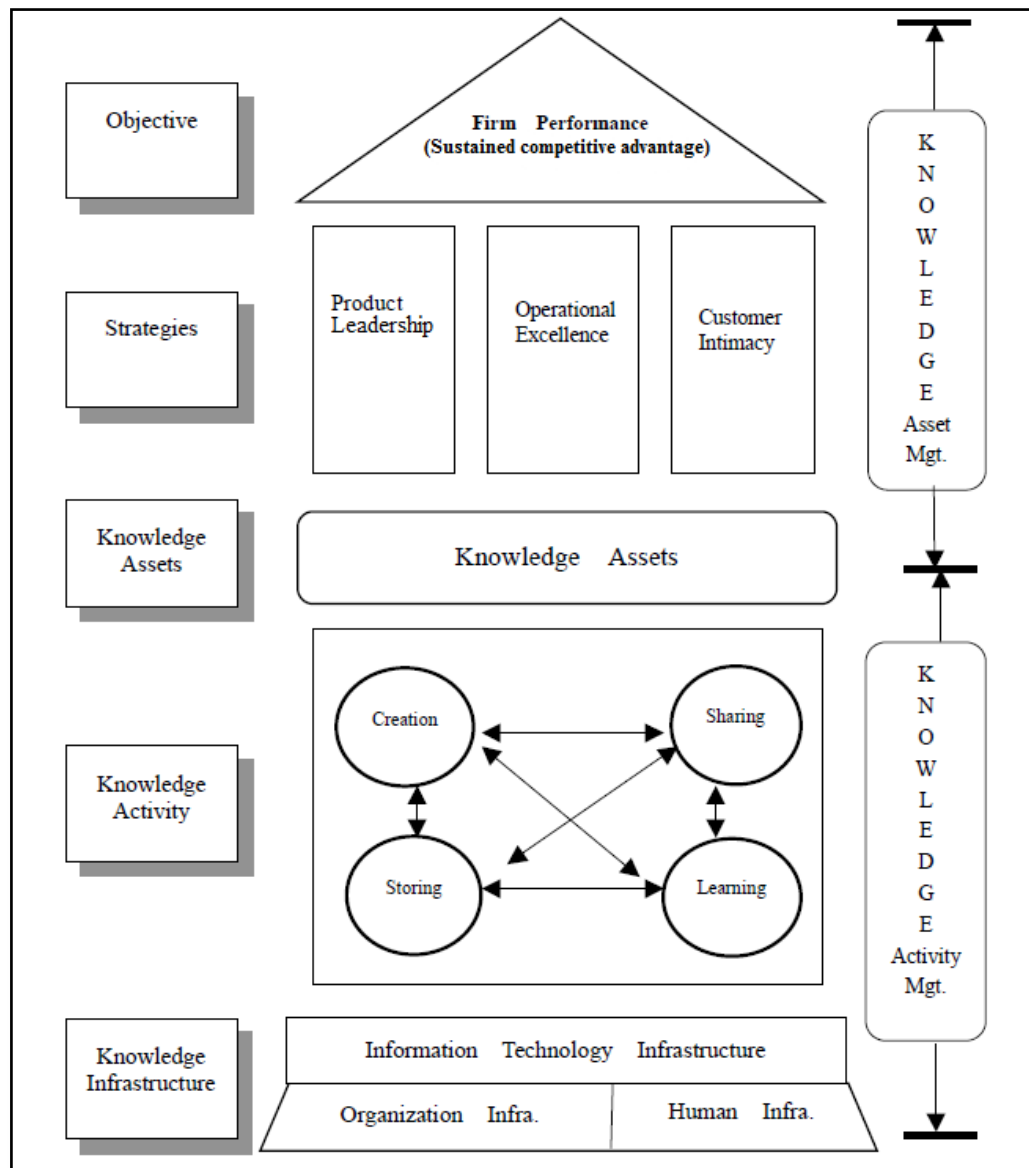
In general, product leadership, operational excellence or customer intimacy assure the firm's competitive advantage. It is not unusual that a firm is not able to pursue all these three strategies at the same time due to limited operational resources. The entrepreneur should select one of these three strategies according to firm's knowledge characteristics and concentrate investments on the selected strategy.

Product leadership is the competitive capacity to create customer value by providing the best product and constantly developing new products. Product leadership leads towards the completeness of a product and the assurance of the firm's competitive position on the market.

Operational excellence implies the competitive capacity to raise efficiency and reduce cost in operation by steering economy of scale, economy of range, standardization and specialization. The firm with an operational excellence provides a cost-efficient product in comparison with competitors by reducing invisible costs as well as visible.

Customer intimacy creates customer value and strengthens firm's competitive advantage by offering optimal solutions for customers based upon the knowledge from intimate relationship with customers.

**Figure 1: The knowledge management model**



Source: Yoon, K.S., *Knowledge management models: an empirical study*, University of New York Publishing, 2008

### 3.3 Knowledge assets

Knowledge assets include necessary knowledge and the knowledge resulted from knowledge activities. Necessary knowledge means the knowledge necessary for implementing the strategies of product leadership, operational excellence or customer intimacy, which are, for instance, brand power, design, patent, creativity, quality management, outsourcing, planning and control, process management, communications skills, information about customers and prompt customer correspondence. Also, knowledge is obtained from the activities like creation, storing, learning and sharing.

### 3.4 Knowledge activities

Knowledge activity is the total process of creation, storing, learning and sharing of knowledge which is embedded in organization and individuals. The objective of knowledge activity is to enhance both explicit and tacit knowledge in terms of quantity and quality. Knowledge creation refers to producing new knowledge while sharing is interchanging available knowledge between organization and

individuals, between organization and organization or between individuals and individuals. Learning is an activity corresponding to acquiring new knowledge through the process of creation, sharing and storing. Storing refers to the activity of obtaining, retaining and classifying knowledge in a systematic order.

### **3.5 Knowledge infrastructure**

Knowledge infrastructure refers to a platform of knowledge activities which is composed of organizational infrastructure (institution and culture included), human infrastructure and IT infrastructure. Organizational infrastructure refers to organizational structure, culture, recruiting, evaluation, compensation, training and human capital management. Human infrastructure is the capacity to facilitate knowledge activities, which includes not only leadership of top management, but specifying the role of knowledge manager, project manager and knowledge worker. IT infrastructure is firm's IT system that supports knowledge creation, sharing, learning and storing, which includes, for instance, groupware, intranetworking and hardware and software. Knowledge infrastructure is a crucial part as a necessary business resource to determine the success of knowledge management. What is important for the knowledge infrastructure is that it should be designed to fit to characteristics and capacity of an organization in particular.

## **4. Current status of SMEs in knowledge management**

It is appropriate to review the current status of SMEs in knowledge management in terms of the fore-mentioned elements of knowledge management.

### **4.1 Strategy**

Product leadership of SMEs is weak analyzing their brand power, design capability and development of new products. Competitiveness of SMEs generally relies on low prices. SMEs are weak in utilizing explicit and tacit knowledge and tend to follow simple "Me too" strategy. SMEs have difficulties achieving operational excellence because most SMEs still stick to labor and capital in their production and operation process. Their focus of operation is mainly on achieving economy of scale or increase in productivity while they neglect the value creation from utilizing knowledge. SMEs cannot actively respond to change in the business environment or emerging new trends because they do not have capability to utilize knowledge and, thus, they are insensitive to challenges from the outside. Unless a firm is able to manage and analyze information or data about environmental changes, a firm cannot excel its competitors. SMEs are accustomed to improvement than innovation because they make investments in knowledge or physical assets with short-term perspective. SMEs tend to prefer immediate improvement of productivity to permanent or fundamental innovation of operational process. This may lead to an increase in divisional productivity but an increase in the efficiency of the total process is disregarded or only sub-optimization is attained rather than global optimization.

In the area of customer intimacy, SMEs are liable to be short of tangible customer information which is crucial for doing customer service. SMEs are not usually equipped with the infrastructure for market research to analyze customer need, customer taste and customer trend and regard the money required for understanding customer behavior and psychology as cost rather than investment.

### **4.2 Knowledge Assets**

Some SMEs start to have an interest in knowledge assets but even those SMEs consider tangible assets more valuable than knowledge assets which are intangible and consequently knowledge assets are inefficiently managed and utilized. SMEs do not recognize necessary knowledge and knowledge gap with competitors because SMEs are ignorant towards the value and usefulness of knowledge. Considerable amount of knowledge is lost in SMEs when employees quit or move to other divisions because they do not know how to store and manage knowledge assets.

### **4.3 Knowledge Activities**

The amount of knowledge creation in SMEs is minimal because evaluation or reward system for newly created knowledge is poor, thus individuals are not motivated in creation of knowledge. Also, it is hardly expected to create knowledge under the circumstances that even the knowledge already existed in SMEs is not stored and managed properly.

Knowledge sharing is formed only among the interested parties at individual level, not at organizational. Individuals in SMEs are accustomed to the preservation of knowledge than sharing with others and consider the possession of knowledge as a source of power and so, try to hide it to raise his/her own value. This tendency incurs opportunity cost and hinders generating synergy effects. Individuals in SMEs are not trained to make learning organization that they have low capacity in absorbing knowledge. Also, individuals do not know what knowledge is learned and stored because there is no guide line or definition for what knowledge is necessary to organization.

#### **4.4 Knowledge Infrastructure**

Knowledge infrastructure is formed by organizational, human and information technological infrastructures. The way of solving problems and the decision-making process tends to be heavily dependent on only owner-entrepreneur's potential without a discussion in which various interested parties would take part. This tendency hinders individuals from developing their creativity and consequently limits knowledge sharing and transfer within an organization. Managers of SMEs tend to be more interested in such visible results as cost reduction, sales increase and productivity increase which can be attained in a relatively short time period than results of knowledge activities produced over a long period. In general, IT infrastructure in SMEs is very poor. Even the SMEs with the vision of knowledge management build IT system to do simple internal data processing of personnel, accounting or sales. It is rare to find "Decision support system (DSS) or Strategic information system (SIS)" in SMEs to support administrative activities. They put an all-in-one style package without considering user needs and user interface, which leads to low usage rate. Also, this package system is designed to fit to a data base storing simple information rather than storing complex knowledge and sharing it.

#### **Conclusion**

Knowledge management is one of the core tasks which application SMEs cannot postpone in order to maintain their competitive position. As it is suggested above, the knowledge management is a holistic approach to improve the firm's competitive advantage, which is different from the old management style that puts more emphasis on individual specialty and capability. The knowledge management is not a new tool or concept. It is rather a new way of doing things aiming towards the production of positive synergy effect by sharing and transmitting the knowledge a firm already owns.

Due to the recent advancement of information technology, SMEs can easily implement the knowledge management with relatively low costs than ever. This paper tries to develop a knowledge management model fitting to SMEs and suggest a strategic agenda according to which SMEs should pay attention in adopting the knowledge management. Since SMEs are poor in the area of knowledge management infrastructure, the entrepreneur's leadership is the most important ingredient to ensure success of the knowledge management. This paper is just an exploratory work which should be followed by empirical studies to ascertain practical implications.

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